Reflection

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MSc4 Urbanism
Graduation studio: Urban Metabolism
9.4 Reflection

The relationship between research and design

Design and research are quite interwoven in the graduation project. This is also reflected in the research question where urban design was the main key word. However, a comprehensive research was executed in order to understand the metabolic system of construction sand and gravel. This research eventually became the context of the design research where improvements were proposed. The design research had a ‘research through design’ characteristic because it, following Frankel & Racine (2010), had an action-reflection character in the approach thanks to the application of the LCA. Design results can be seen as improvement to the situation as an exploration of the system.

Relation between graduation project topic, the studio topic, master track and master programme

The research to reduction of material consumption within the construction sand and gravel metabolism is done within the graduation studio Urban Metabolism. The studio focuses on the understanding of the metabolism of urban environments with a focus to develop new urban system which are less damaging the environment (TU Delft, n.d.). The graduation project focuses on one particular flow within the urban metabolism, sand and gravel, and reveals its ecosystem. Another aspect in the studio is: ‘Metabolism tools can help to assess and aid the growth (and decline) of cities and the relation between the methodical approach of the graduation lab and the chosen method in the developed framework’

The material flow analysis is a general method within the field of urban metabolism (Newell & Cousins, 2015). This method was used and extended with dynamic stock model and material intensity model methods in order to analyse the (future) construction ecosystem. The life-cycle assessment is related to the concept of urban metabolism but currently not integrated in the field of urbanism. This and the material consciousness idea can be an interesting approach to bring urban design and material flows closer to each other in the design process. The TM-LCA can be used to elaborate between different disciplines in order to emphasise the interdisciplinary character of the topics and concepts within urban metabolism.

Transferability of the project results

Research and design approach is well suitable for transferability to current challenges and projects in circular construction. The proposed approach of material consciousness and tools such as the TM-LCA scheme are interesting to develop further for societal application. However, the quantitative results are questionable due to the high level of assumption, as mentioned in the discussion section of this chapter. An environmental and technical evaluation should be done on the results in order to justify the quantitative results.

Societal and scientific relevance

Circularity and consumption reduction are global challenges which several governance and institutions want to achieve. The related environmental impact can be related with the Paris Agreement for CO2 reduction which can be achieved when for example biobased material is used with an end-of-life scenario without incineration or peat land transformation to wetland to prevent peat oxidation. This project contributes to the understanding and approaching of the systems which relate to these challenges and visualises examples of future design outcomes.

Within the scientific field of the concept of urban metabolism, focus has rarely been on the construction ecosystem (Zhang, Lu, Wing-Yan Tam, & Feng, 2018). This study unravels the relation between urban metabolism and the construction ecosystem and links it with theories from civil engineering studies. The approach in both the analysis and design are useful for studies on the topic and its impact. The TM-LCA scheme can contribute to the studies towards environmental impact and improvement within the design and strategy for urban regions.

Ethical issues

The graduation project promotes a circular construction ecosystem where secondary resources are used in new construction. However, some potential solutions, such as EPS for subsidence solution, have a low availability, according the assumption. We want to consume responsible and achieve a zero material take from the remaining reservoirs but this means that we need to balance the current material stock within our ecosystems. Scarce but demanded material can thus cause inequality between urban regions where some areas can benefit from the use of recycled EPS for subsidence maintenance, while other cannot.